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HISTORY OF GRAIN DRILLS

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A very interesting article entitled "Some 4730 years of grain drill history" by W.L. Braley, (3, pp.30-31) 1/ states that "The story of the grain drill is recorded simultaneously with the history of man from the primitive stage. In order to fully realize its importance we find it necessary briefly to review man's fight for food through the ages. First, he depended on nature's bounty, and later his efforts were directed toward a better and surer means of providing for his necessities, and for the necessities of those dependent upon him. Originally man plucked the wild grain from the stalk to satisfy his immediate hunger. Then, his dawning intelligence sharpened by dire experience, he learned to sow and reap a slender crop, using the most primitive implements. Afterwards larger fields, planted and cultivated by clumsy but still improving tools which were the direct result of this more intelligent handling, gave greater crops. Down through the ages this progress has continued, each new development assuring greater production."

The Report of the Commissioner of Agriculture for 1870 (9, pp. 400-401) states that "From history we are led to believe that the first, and for ages the only, mode of sowing seed was by hand, by which the seed was used with but little economy, and scattered with but little precision."

Butterworth (4, p.6) relates that "Seeding in ancient Egypt was done by scattering the seed upon the mud left after the receding waters of the Nile. The husbandman who scattered it was followed by a flock of sheep or goats, whose feet trod the seed into the surface of the soil."

While "history fails to tell us who invented the first seeding machine, or even where it was made", yet it does record that "a rude kind of drill has been used from a very remote period," ***** and that "the husbandmen of China, Japan, Arabia and the Carnatic have drilled and dibbled in their seed from time immemorial." (9, p.400)

Braley (3, p.30) states that "The first mention of a machine for seeding or drilling grain occurs in Chinese history about 2800 B.C. This was of the wheelbarrow form having a hopper to hold the seed, with three spouts carrying the grain through crude furrowing devices into the soil. From an old

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1/ Figures in parenthesis refer to References cited at end of article.

account in the British Department of Agriculture it also appears that a form of drill has been used in India almost from time immemorial. This Indian drill consisted of a hopper set on a plow from which seed was deposited in the furrow."

This Indian drill seems to resemble in some respects an implement described in the Quarterly Journal of Agriculture, v.1, May, 1828-August, 1829, p.675 (published in Edinburgh). "Timbowtki, a Russian officer, who conducted a mission to and from Peking in 1821, on their return, a few days after leaving Peking, states as follows:- 'We saw some Chinese at work in the fields. Their usual plough, which resembles ours (Russian), is drawn by two oxen; then they employ a sowing machine, which has a great resemblance to the plough, and has three hollow teeth, with iron supports; above the wheels there is a box, from the bottom of which the seed falls through the teeth, which are about an arsheen (28 inches) in length, constantly following the motion of the plough in the furrows. Behind is a small wooden roller, which covers the seed which has been sown, and supplies the place of a harrow.'"

Braley continues, "The next authentic mention of the grain drill in history is through cuneiform writing and illustration of Assyrian origin about 504 B.C. The description of this drill leads to the belief that it was the same or very similar to the one used in India previously mentioned. This implement was of wood, crudely shaped in the form of a plow, having a bowl-shaped seed container. The seed was carried to the furrow through a wooden spout. (3, p.30)

In the Report of the Commissioner of Agriculture for 1870 (9, p.400) appears this statement:- "There was invented in Germany, about the year 1056, a drill-plow, the construction of which is unknown."

Butterworth (4, p.6) is authority for the statement that "The Italians claim the honor of originating in 1605 the first seeder." This implement is described by Braley (3, p.30) as being "a machine for sowing grain in drills or rows. This machine was mounted on two wheels and had a rectangular seed box depositing three or four rows of seed into a broad shallow furrow produced by a single large furrow opener."

The first English patent for a seeding machine, according to (9,p.400) was granted to Alexander Hamilton, on November 27, 1623." As the machine was not described in the specifications, nor a plate furnished, the exact form of it is uncertain. The title of the invention reads as follows:

"A spiall privilege granted to Alexander Hamilton, esqre., (for twenty-one years), of the sole practise within England, Ireland, and the dmons thereof, of a newe invencon, by him invented and perfected, as well for the ploughinge, as for the harrowinge, sowinge, seedinge, and settinge of corn and grain at greater ease and with more pfett than by anie other means heretofore used."

In 1634 David Ramsey made an unsuccessful attempt to build a seeding machine. (4, p.6)

There is some uncertainty as to the date of the invention of a seeding machine by Joseph Locatelli, an Austrian, but it seems to have been given a trial at Luxemburg, in 1662, and to have been patented in Spain, (4, p.6) It is described by Braley (3, p.30) as being "mounted on wheels, had a rectangular seed hopper fitted with a mechanism for carrying out the grain which fell on the ground, and was then covered with a toothed device dragging behind. This machine was first tried out in Luxemburg, where the English Earl of Sandwich saw it and had it sent to England for his own use. Later (in 1730) Jethro Tull an 'advanced thinker' of his time got possession of this machine and was so taken with its possibilities that he made many improvements, of which, however, his historians have failed to give any explanation. This drill received a great deal of publicity for the time. There is evidence that it was manufactured in Madrid in 1664, and sold at a price fixed in the patent."

Braley's article continues as follows:- "John Evely presented one of these machines to the Royal Philosophical Society of London with a complete description and operating instructions. In his letter of presentation he stated, 'Even at this date all sorts of seeds of corn and grain are sown by the handful, thrown out by aim, heedlessly and by chance.' ***** (3, p.30)

"After Tull, the grain drill was greatly improved by Dr. James Cook, a clergyman of Lancashire, England. It is a notable fact that his improvements were adopted in subsequent machines in that country." (3, p.30)

In Agricultural Machinery, by J. Brownlee Davidson, p.151, it is stated that "one of the earliest machines for drilling seeds was devised by Jethro Tull and described in his work on 'Horse-Hoeing Husbandry' in 1731. Tull, who was an earnest advocate of tillage, proposed that grain, instead of being broadcast, should be drilled in rows and cultivated. An interesting feature of Tull's machine was that grain was covered at three depths, the theory being that if one of the three seedings failed the others would succeed."

In (9, p.400) it is stated that "About the year 1733 Jethro Tull invented a machine to sow wheat and turnip seed in drills, three rows at a time, and to Tull is given the credit of inventing the cylinder with cavities in the surface of the same for feeding the seed."

It is stated in Scottish Journal of Agriculture, v.9, no.1, January, 1926, p.53, that "To Jethro Tull and to England belong the credit for the invention of the drill, and for the essential idea of drill husbandry. But it was in Scotland that the practical application of Tull's system was first worked out, and that Tull's aim of 'clean farming without fallows' was first realized."

Robert L. Ardrey, in American Agricultural Implements, p.26, quotes as follows:- "In Croker's 'Dictionary of Arts and Sciences', published in London, in 1765, is the following description:- 'Drill or Drill Box', a name given to an instrument for sowing land in the new method of horse-hoeing husbandry (introduced by Tull). It plants the corn (grain) in rows,

makes the channels, sows the seeds in them, and covers them with earth when sown; and all this at the same time, and with great expedition. The principal parts are the seed-box, the hopper, the plow and its harrow, of all which the seed-box is the chief. It measures, or rather numbers out the seed which it receives from the hopper, and is for this purpose an artificial hand; but it delivers out the seed much more equally than can be done by a natural hand.' **** (2, p.26)

"In Dodsley's Annual Register for 1764, a seed-plow is mentioned as having been made to go to York. It was mounted on two wheels, to be drawn by one or two horses. It made several furrows at once and would sow any kind of seed and cover at the same time, 'all with great expedition and exactness.' This was practically the crude predecessor of the modern grain drill." (2, p.26)

A clergyman, named Cooke, is said to have made many improvements on seeding machines. (2, p.26) "His drill and horse-hoe described in Louden's Encyclopedia in 1831, was a convertible machine, that is, the seed apparatus was made so it could be detached, thus making a cultivator of the implement. One of these seeders is described as follows:- 'The seed-box is of a peculiar shape, the hinder part extending lower than the fore part. It is divided by partitions and supported by adjustable bearings so as to preserve a regular delivery of the seed, while the machine is passing over uneven ground. The feeding cylinder is made to revolve by a toothed wheel which is fixed on each end of the main axle, and gears with other toothed wheels on each end of the cylinder. The surface of the cylinder is furnished with a series of cups which revolve with it and are of various sizes according to the different seeds intended to be sown. These deposit the seed regularly in funnels, the lower ends of which lead immediately behind the coulters, which are connected by a beam so as to be kept in an even line, and are capable of being held out of working, when desired, by a hook and line in the center. The seed, as it is deposited, is covered by a harrow fixed on behind. The carriage wheels are larger than usual, by which means the machine is more easily drawn over uneven ground, and the labor of working is reduced. On this machine the grain spouts consisted of a number of tapering pipes or funnels fitted into one another so as to form flexible tubes.'" **** (2,p.26-27)

"In the hand-drill barrow, described by Louden, may be seen the predecessor of the one-horse drill." **** "It is a suggestion also of the lister, a modern American implement. A wheelbarrow seeder, such as is used for sowing grass seed, was introduced in England about 1820, and it is stated that in certain parts of England and southern Scotland, a one-horse seeder on the same principle was in use for grain seeding, the seed-box being large and mounted above two low wheels." (2, p.27)

"The first United States patent on grain drills was granted to E. Spooner, January 25, 1799"(3, p.30) (Some writers state that this patent covered a corn planter.) "From the meager description we are led to believe that it was very similar to that invented by Locatelli. It was shortly after the registering of this first United States patent that Hornsby, an English inventor, brought out the first rubber tubes or spouts." (in place of tin cups (4, p.6) **** "At approximately the same time" an English

firm "contrived several ingenious improvements for the grain drill increasing its capacity for holding grain and providing a greater number of furrow openers or coulters, frequently employing as many as twenty. Self-regulating drag bars were provided to which the furrow openers were attached. Each bar was pivoted independently of the other. The free end of the bar was weighted for the purpose of pressing the furrow openers into the soil a certain required distance. Later on an inventor, by the name of Garrett, devised a grain drill adapted for the operation of seeding and manuring or fertilizing the land. As a result of this invention, all kinds of grain and seeds were deposited at required depths and distances apart in connection with artificial manures or fertilizers. These grain drills were constructed in various widths to suit the description of the land. The fertilizer and seeds were sown through the same delivery tube." (3, p.30)

"Between 1830 and 1850 the drill with the hoe furrow opener was perfected, this type still being used in some sections of the United States as well as abroad. Similar to the present types of drills in appearance it had a long seed box or hopper mounted on a rectangular wooden frame with a wheel at each end. The wheels were arranged to drive a mechanism mounted on the hopper bottom which carried out and deposited the seed in the rubber tubes by which it was carried to the furrow openers. Hinged to the front of the frame so that the rear ends could be raised or lowered were bars with hollow pointed hoes attached through which seed from the rubber tubes was conducted into the furrows produced by these hoes." (3, p.30-31)

"August 22, 1828, a patent was granted to Orson Starr, of Richmond, Ontario County, New York, for a 'machine for planting grain and other seeds.'" **** This machine is said to have had "handles and a beam similar to the common plow, supported from the rear by wheels; beneath and about the center of the beam there is a shovel plow to open the furrow for the reception of the seed, and to the rear of the machine is attached an iron scraper to close the furrow after the seed is dropped. On the top of the beam is placed a hopper in which a cylinder is made to revolve by suitable mechanism. The cylinder is made of sheet iron; the edge of it is perforated at suitable distances to receive pieces of metal which act as valves working upon a pin, and forced out by springs contained within the wheel, so as to project beyond its periphery, but capable of being forced in when passing the ends of the slot in the bottom of the hopper. These valves contain the quantity of seed to be dropped in each hill, and may be more or less numerous according to the distance at which they are to be dropped in the furrow." (9, p.401)

It is related in Farm Machinery and Farm Motors, (6, p.103) that "A patent was granted to J. Gibbons, of Adrian, Michigan, August 25, 1840. Gibbon's patent was upon the feeding cavities and a device for regulating the amount delivered. A year later he patented a cylindrical feeding roll with different-sized cavities."

According to (2, p.27) an "important patent" **** was granted in 1835 and reissued in 1838. It was on a machine designed to sow lime and plaster, and as reissued showed that the invention was intended to sow

grain also. In 1837 another patent was granted, covering the application of centrifugal force, to sow lime, plaster and small grain. In 1838, a patent was issued for a grain drill in which a spring-arm attached to a horizontal shaft revolved within the hopper and agitated the grain over the mouths of the tubes through which it was distributed.

"Among the early inventors who made substantial improvements in the invention of drills, were M. and S. Pennock, of East Marlboro, Pa., who made considerable progress in the development of 'cylinder drills.' Their first patent, dated March 12, 1841, and reissued October 30, 1849, covered the simultaneous throwing into and out of operation by a lever of each seeding cylinder, and its corresponding tube and drill, and made so as to use any number of hoes desired. It covered also an arrangement of spur wheels for connecting the seed cylinders and hoppers to the shaft, so that they could be thrown into and out of gear when the drill was in motion. Many other patents were issued to this firm, most of them covering improvements in cylinder drills, in which a series of cylinders operated over a series of hoes or tubes." (2, p.27-28)

"After 1850, agricultural engineers recognizing that accuracy in placing the proper quantity of seed in the furrow was vital for producing the best result, occupied many years developing the seeding mechanism now known as grain feeds or distributors. These were brought up to a high standard, the most notable being one designed by Charles E. Patric," (probably about 1867 (2, p.28) **** "which was called the double-run force feed." **** "originally this distributor was driven by spur gears, several sizes being furnished to take care of demands for various quantities." **** "Later Mr. Patric designed a multiple-row bevel gear, which, mounted on the axle, was connected to the feeds through a bevel pinion, slidably mounted so that it could be meshed with any one of the multiple rows. This multiple gear with its thirteen rows of teeth provided adjustment for twenty-six different quantities, and being a self-contained unit was a distinct advance over previous methods." (3, p.31)

In (5, pp. 151-152) it is recorded that "The fluted force-feed took definite form in the mechanism patented by Foster, Jessup, H.L. Brown and C.P. Brown, in 1851. The inside feed shell was developed by A. Berkford in 1867. The scheme of varying the length of the active part of the feed shell was patented by J.P. Fulghum in 1877. The early drills had hoes for furrow openers, the shoe being developed later for work in trashy ground."

Patents were granted at an early day on "adjustable rank" drills, or those having devices for shifting the hoes from a straight rank to a staggered position. One of the most important was that of Charles F. Davis, February 18, 1868. (2, p.29)

About 1870 inventors turned their attention to shoe drills. "The broadcast seeder, with a slide distributor, and later a force feed, preceded the drill in general use in the West." **** "Fertilizer distributors are quite generally used on drills in the East." **** "Grass-seeding attachments are in general use." (2, p.29)

Rogin, (7, p.203) states that "In the early seventies the end-gate seeder, a rotation machine attached to the rear end of the wagon box and driven from the sprocket of one of the rear wheels, was introduced into the spring-wheat regions of the Mississippi valley."

In (3, p.31) appears the statement that "The hoe furrow opener type of drill with various improvements was used until 1893, but on account of the labor involved in preparing the soil (removal of surface trash which would gather and drag ahead of the hoes being necessary) engineers were working to develop a different type which would not require so much prior preparation of the land. In 1893 Frank R. Packham brought out what is known as the double-disc furrow opener. The double-disc furrow opener used two steel discs set at an angle with the front edges together to cut the furrow. These discs prepared a furrow through any reasonable amount of trash, which relieved the farmer of much land preparation and enabled him to sow more grain in a given amount of time.

"This device, hailed as the greatest advance in seeding machine construction in several decades was eclipsed one year later by Mr. Packham's invention of the single-disc furrow opener, which was made by mounting a sharp edged concave steel disc at an angle to the line of draft. The sharp edge cut in while the concave face lifted up the soil long enough for the seed to reach the bottom of the furrow through a tube fastened along the side and back to the center of the disc before the soil fell back and covered it. This was the lightest draft furrow opener developed. It paved the way for larger units with greater savings in labor. The disc furrow opener rendered the hoe type obsolete in many sections. (3, p.31)

"During recent years the grain drill has kept pace with the progress of time. Pressure-feed oiling, anti-friction bearings and high carbon steel parts all of which assure strength, durability, and accuracy in seeding, are standard in the drills which the farmer buys today. (3, p.31)

"A recent development, a boon to winter wheat growers in dry farming sections, is the furrow drill, which places the seed at the bottom of specially prepared furrows, the high ridges between the furrows protecting the young plants from weather conditions and conserving moisture." (3, p.31)

The modern grain drill has the improved features and refinements typical of present (1935) farm machinery design. Grass seed and fertilizer attachments as well as numerous interchangeable parts and devices are available, thus making the grain drill adaptable to many uses and conditions. Drills range in size from simple one-horse machines to large power-lift tractor-drawn drills. Broadcast seeders of various types, including the endgate seeder, are used to some extent in certain areas.

"As farming methods have changed from man to animal power, and from animal power to tractor power, grain drills have been developed to meet conditions. The history of the grain drill is the history of the struggle of mankind to produce the bread upon which it depends for life." (3, p.31)

(1) Anonymous.

1828-1829. On the Chinese drill. Quarterly Journal of Agriculture. v. 1, p.675. Wm. Blackwood, Edinburgh.

(2) Ardrey, R.L.

1894 American agricultural implements. 236 p. illus. Chicago, Illinois.

(3) Braley, W.L.

1930 Some 4730 years of grain drill history. Farm Implement News, v.51, no.18, May 1, 1930, p.30-31. illus. Chicago, Illinois.

(4) Butterworth, Benjamin.

1888 The growth of industrial art. 200 p. illus. Washington,D.C.

(5) Davidson, J.B.

1931 Agricultural machinery. 396 p. illus. New York.

(6) Davidson, J.B. and Chase, L.W.

1918 Farm machinery and farm motors. 513 p. illus. New York.

(7) Rogin, L.

1931 The introduction of farm machinery in its relation to the productivity of labor in the agriculture of the United States during the nineteenth century. University of California publications in economics. v. 9, 260 p. illus. Berkeley, California.

(8) Watson, J.A. Scott.

1926 Farm implements in Scotland. Historical notes. Scottish Journal of Agriculture. v.9, January, 1926. p.46-54.

(9) U.S. Commissioner of Agriculture.

1871 Grain drills and corn planters. Report for 1870. p.400-401. Washington, D.C.

FARM MACHINES, OLD AND NEW, IN PICTURES:

FOR GRAIN SEEDING

FOR GRAIN SEEDING

Figure 1.- Sowing by hand.

Figure 2.- A wheelbarrow seeder, a type still in use. Such machines are said to have been used in China about 2800 B.C.

Figure 3.- An endgate seeder attached to a wagon box and operated from a sprocket fastened to a wheel of the wagon.

Figure 4.- A modern tractor-drawn grain drill some features of which were originated as early as 1733.

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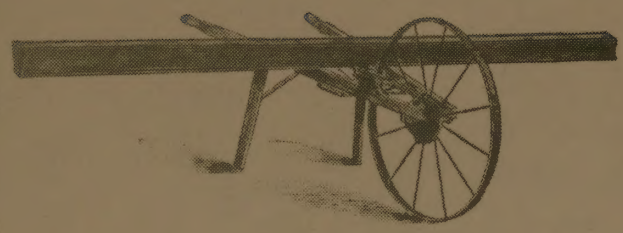

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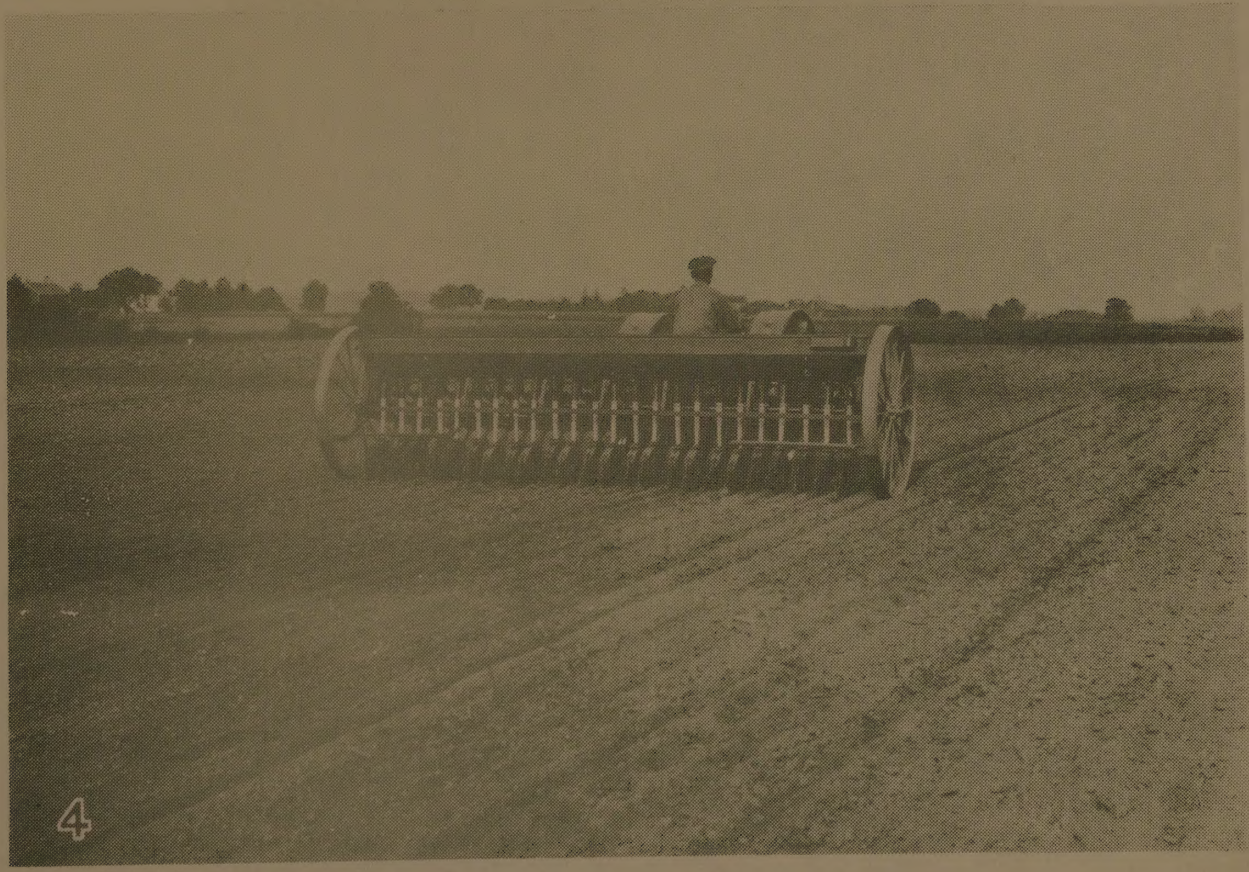

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